

Protocol: t_ctlivfat_2005_1_0001d

STUDY NAME: Hepatic Steatosis by Computed Tomography

DESCRIPTION AND PURPOSE OF STUDY (INCLUDING DESCRIPTION OF PARTICIPANTS STUDIED):

Participants for this study were drawn from the Framingham Heart Study Multi-detector Computed Tomography (MDCT) Study, a population-based sub-study of the community-based Framingham Heart Study Offspring and Third Generation cohorts. Beginning in 1948, 5209 men and women aged 28 to 62 years were enrolled in the original cohort of the Framingham Heart study. The offspring and spouses of the offspring of the original cohort were enrolled in the Offspring study starting in 1971. Selection criteria and study design have been described elsewhere.^{1,2} Beginning in 2002, 4095 Third Generation participants, who had at least one parent in the Offspring cohort, were enrolled into the Framingham Heart Study and underwent standard clinic examinations. The standard clinic examination included a physician interview, a physical examination, and laboratory tests. For the current study, the study sample consisted of Offspring and Third Generation participants who were part of the MDCT sub-study.

Between June 2002 to April 2005, 3529 participants (2111 Third Generation, 1418 Offspring participants) underwent MDCT assessment of coronary and aortic calcium. Inclusion in this study was weighted towards participants from larger Framingham Heart Study families and those who resided in the Greater New England area. Men had to be at least 35 years of age, women had to be at least 40 years of age and non-pregnant, and all participants had to weigh less than 350 pounds. 433 of the participants (222 Offspring and 211 Third Generation) were imaged as participants in an ancillary study using an identical imaging protocol, the National Heart, Lung, and Blood's Family Heart Study.³

CT Imaging Protocol

Subjects underwent eight-slice MDCT imaging of the chest and abdomen in a supine position as previously described (LightSpeed Ultra, General Electric, Milwaukee, WI).⁴ Briefly, twenty-five contiguous five mm thick slices (120 kVp, 400 mA, gantry rotation time 500 ms, table feed 3:1) were acquired covering 125 mm above the level of S1. In the chest 48 continuous 2.5-mm thick slices (120 kVp, 320/400 mA [for < and > 220 pounds of body weight, respectively], gantry rotation time 500 ms, temporal resolution 330 ms) were acquired during a single breath hold and reconstructed using a 35 cm field of view.

A calibration control (phantom) (Image Analysis, Lexington, KY, US) with water equivalent compound (CT-WaterTM) and calcium hydroxyapatite at 0, 75, and 150 mg/cm³ was placed under each subject.

Hepatic Steatosis tissue measurements

Hounsfield Units (HU) of the liver, spleen and paraspinal muscles as well as an external phantom control were measured. The protocol consists of three measures of at least 100 mm squared in the liver, two in the spleen, one in the left and one in the right paraspinal muscles and one in an external phantom. Intra- and inter-reader reproducibility of the liver-to-spleen ratio was 0.98 and 0.99, of the liver-to-phantom ratio was 0.99 and 0.99, and of the liver-to-muscle ratio was 0.93 and 0.86, respectively.

HISTORY (TIMELINE):

Scans were completed between 2002-2005.

Reference List

- (1) Dawber T.R., Kannel W.B., Lyell L.P. An approach to longitudinal studies in a community: the Framingham Heart Study. *Ann NY Acad Sci* 1963; 107:539-556.
- (2) Shurtleff D. Some characteristics related to the incidence of cardiovascular disease and death: Framingham Study, 18-yea follow-up. Section 30. In: Kannel WB, Fordon T, eds. *The Framingham Study: an epidemiological investigation of cardiovascular disease*. Washington, D.C.: Department of Health, Education, and Welfare, 1973. (DHEW publication no. (NIH) 74-599.).
- (3) Hopkins PN, Ellison RC, Province MA et al. Association of coronary artery calcified plaque with clinical coronary heart disease in the National Heart, Lung, and Blood Institute's Family Heart Study. *Am J Cardiol* 2006; 97(11):1564-1569.
- (4) Maurovich-Horvat P, Massaro J, Fox CS et al. Comparison of anthropometric, area- and volume-based assessment of abdominal subcutaneous and visceral adipose tissue volumes using multi-detector computed tomography. *Int J Obes (Lond)* 2006.